

SAMPLING AND QUALITY ASSURANCE PLAN III

BAYONNE BARREL AND DRUM SITE
NEWARK, ESSEX COUNTY, NEW JERSEY

**CHARACTERIZATION OF SOILS LOCATED
BENEATH FORMER DRUM PILES**

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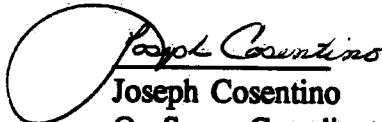
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TABLE OF CONTENTS

	<u>PAGE</u>
1.0 BACKGROUND	1
2.0 PROJECT SCOPE & DATA OBJECTIVES	1
3.0 QUALITY ASSURANCE OBJECTIVES	3
4.0 SAMPLING APPROACH & METHODOLOGIES	3
4.1 Sampling Design	3
4.2 Sampling Equipment	4
4.3 Standard Operating Procedures (SOPs)	4
4.3.1 Sample Documentation	4
4.3.2 Soil Sampling	6
4.3.3 Sample Handling & Shipment	6
4.4 Schedule of Activities	7
5.0 PROJECT ORGANIZATION AND RESPONSIBILITIES	7
6.0 QUALITY ASSURANCE & QUALITY CONTROL REQUIREMENTS	7
7.0 DELIVERABLES	8
8.0 DATA VALIDATION	8
9.0 SYSTEM AUDIT	8
10.0 CORRECTIVE ACTIONS	8

LIST OF FIGURES

Page

Figure 1 - Site Location Map

2

LIST OF APPENDICES

Appendix A - Soil Sampling SOP

Appendix B - Sampling Equipment Decontamination SOP

SAMPLING AND ANALYSIS PLAN
BAYONNE BARREL AND DRUM SITE
NEWARK, ESSEX COUNTY, NEW JERSEY

1.0 BACKGROUND

The Bayonne Barrel and Drum Site (BB&D) is a former drum reconditioning facility occupying approximately 15 acres off Raymond Boulevard in the Ironbound section of Newark, New Jersey (see Figure 1). The facility operated as an unlicensed Treatment, Storage, and Disposal (TSD) facility from the early 1940's until the early 1980's when the company filed for bankruptcy under Chapter 11. The site is bordered to the north and west by Routes 1 and 9, to the east by the New Jersey Turnpike and to the south by a movie theater.

Operations by Bayonne Barrel and Drum included incineration of open-head drums within site building #2 as a part of the drum reconditioning process. Incinerator ash, generated as a result of the unpermitted incinerator, was placed within eight (8) ash piles which encompass approximately 11,375 square feet of acreage at the southwestern corner of the site. Additionally, incinerator ash exists in building #2 and within the adjacent courtyard between buildings #1, #2, #3, and #4 (see figure 2). Incinerator ash which existed on the floor and within six (6) floor troughs of building #2 was removed and staged into three (3) thirty cubic yard roll-offs.

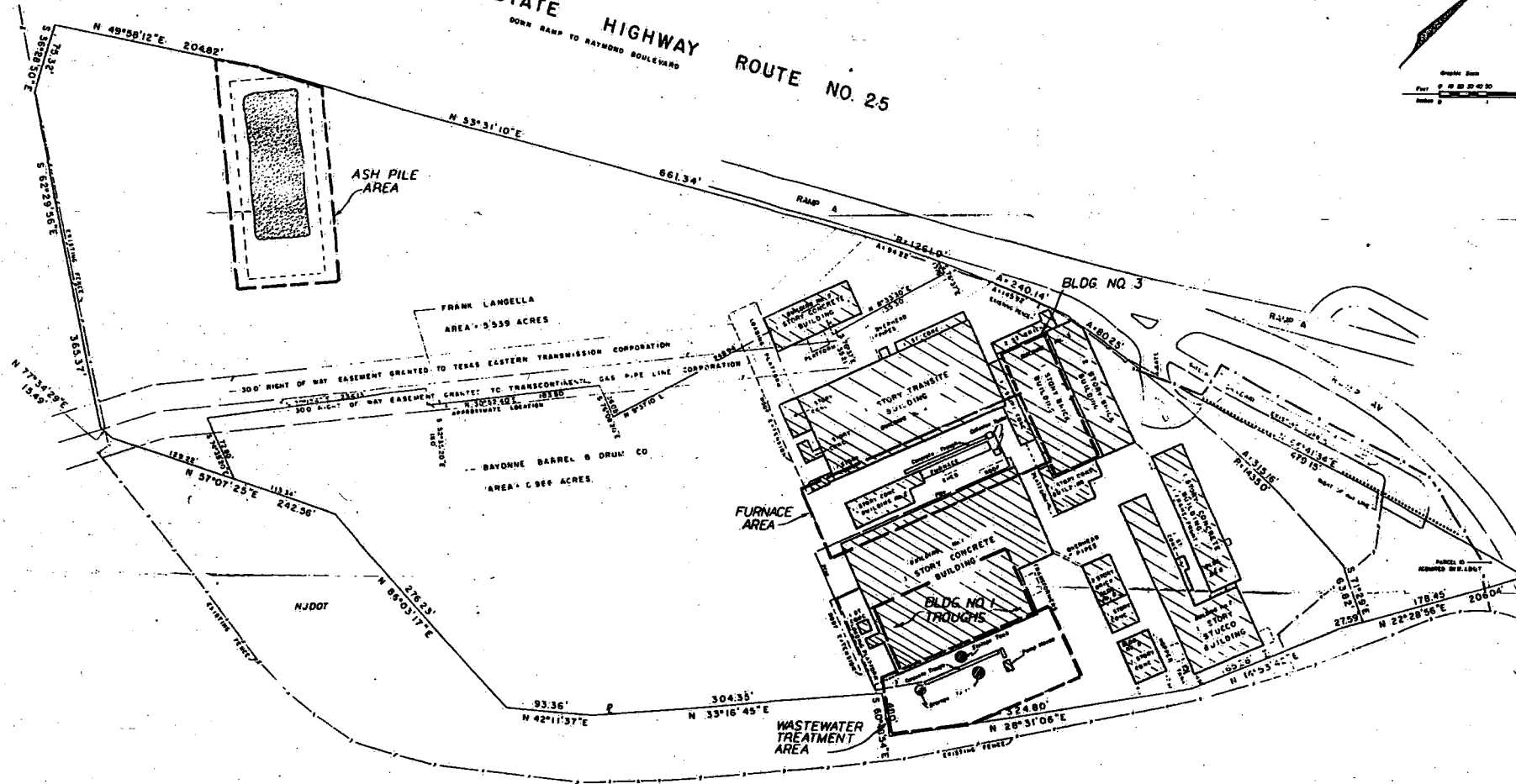
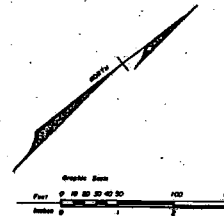
As a result of the incineration process, the soil and ash on the site have been found to be contaminated with polychlorinated biphenyls (PCBs); polychlorinated dibenzo-p-dioxins (tetra- through octachlorinated homologues; PCDDs), and polychlorinated dibenzofurans (tetra- through octachlorinated homologues; PCDFs). The presence of such compounds on-site are further substantiated by the existence of drums on-site with generator hazardous waste labels. The labels have RCRA waste codes F001-F005 (spent halogenated solvents or non-halogenated solvents). These RCRA waste codes are potential PCDD and PCDF precursors.

2.0 PROJECT SCOPE & DATA OBJECTIVES

The EPA Removal Action Branch (RAB) has tasked Roy F. Weston, Inc. under the EPA Region II Technical Assistance Team (TAT) contract to characterize the soil under the former drum piles due to leaking drums. If CERCLA hazardous substances are present, delineation of the horizontal and vertical extents of contamination may be necessary. Additionally, the chemical compounds identified will be used to evaluate PRP attributability for cost recovery.


NEWARK, ESSEX COUNTY, NEW JERSEY

NEW JERSEY
STATE HIGHWAY
DOWN RAMP TO RAYMOND BOULEVARD
ROUTE NO. 25



NEW JERSEY TURNPIKE

NOTE:
DATA FOR NESTS AND BURDS,
EXISTING STRUCTURES AND PROPERTIES
LOCATED ON THIS BARREN COMPILED
FROM ORIGIN BY BOWNE, McCONALD &
WATSON, SURVEYORS. Feb. 29, 1972

SOLID WASTE MANAGEMENT, UNITS				
BAYPINE: BAYVIEW & DREAM COMPANY				
150 Raymond Blvd., Mount., New Jersey, 07105				
 Diversified Environmental Resources Inc. 1400 Pennington Road Lanham, Texas 77653-1518	Learn by	MR.	Date	
	On	MR.	DATE	
	Project No.	09-0183	Sheet No.	88-001

3.0 QUALITY ASSURANCE OBJECTIVES

As identified in Sections 1.0 and 2.0 the objective of the project/event applies to the following parameters:

<u>Sample Parameter/Fraction</u>	<u>Analytical Method Reference</u>	<u>Holding Time (Days)</u>	<u>Volume</u>
<u>TCL</u>			
VOLATILES (VOA)	SW-8240	10	2 X 120 ml
SEMI-VOLATILES (BNA)	SW-8250	7	1 X 8 OZ.
PCB/PEST	SW-8080	7	INCL.W/VOA
<u>TAL</u>			
METALS	SW-7000 SERIES	26 (Hg only) 178	1 X 8 OZ.
CYANIDES	SW-9012	14	INCL. W/METALS

- NOTE:
1. Sample matrix is soil (low/med concentration)
 2. Sample preparation methods for TCL fractions; SW-5030 (VOA) and SW-3510/3540 (BNA/PEST/PCB)
 3. Sample preparation methods for TAL parameter is SW-3050 for all metals except cyanide
 4. Sample preservation is cool to 4C
 5. Sample QA/QC objective is level 2
 6. Limit of detection is analyte-specific

4.0 SAMPLING APPROACH & METHODOLOGIES

4.1 Sampling Design

The former drum pile area is located in the southwest corner of the site. In order to accurately characterize the areas of suspected contamination, only the soils located directly beneath the three (3) drum piles will be sampled.

Three (3) transects will be delineated within the center of each former drum pile. A systematic sampling scheme with fifty foot intervals between nodes will be utilized. Based on former pile dimensions, four (4) sampling locations will be defined along each transect, with the initial sampling location for each transect being biased.

A total of twelve (12) soil samples will be taken at a depth of 6-12 inches and analyzed for full Target Compound List (TCL) and Target Analyte List (TAL) including cyanide analyses.

Additionally, one (1) duplicate soil sample, one (1) field blank and one rinsate blank will be analyzed for TCL and TAL. Triple volume will be taken at one location to include matrix spike and matrix spike duplicate analysis. These additional samples will thereby satisfy the requirements of Quality Assurance Level Two.

4.2 Sampling Equipment

Sample containers will be specially-cleaned laboratory glassware, as directed under OSWER Directive 9240.0-05: Specifications and Guidance for Obtaining Contaminant-Free Sample Containers (July 1989). The outside of the sample jars will be wiped clean using plain paper towels to prevent possible spread of contamination beyond the decontamination zone.

Sub-surface soil samples will be collected using dedicated stainless steel bucket augers, thereby necessitating the decontamination of sampling apparatus between sample locations. Decontamination procedures in the field are in accordance with EPA sampling equipment decontamination and will consist of the following:

- 1) Wash and scrub with low phosphate detergent;
- 2) Deionized water rinse;
- 3) 10% nitric acid rinse;
- 4) Hexane rinse;
- 5) Methanol rinse;
- 6) Deionized water rinse;
- 7) Air dry;
- 8) Wrap in aluminum foil, shiny side out, for transport.

4.3 Standard Operating Procedures

4.3.1 Sample Documentation

All sampling information will be completed legibly and in ink. Any mistakes that are made will be denoted by a single line to cross out the mistake and the initials of the transcriber.

4.3.1.1 FIELD LOG BOOK

The field log book details site activities and observations such that it can account for field procedures and pertinent information in the transcriber's absence. All entries will be dated and signed by the transcriber and will be maintained by the sampling contractor. The following information will be recorded:

1. Site name and project number;
2. Name(s) of personnel on-site;
3. Dates and times of all entries (military time);
4. Descriptions of all site activities, including site entry and exit times, noteworthy events and discussions, site observations;
5. Weather conditions;
6. Identification and description of samples and locations;
7. Subcontractor information and names of on-site personnel;
8. Date and time of sample collections, along with chain-of-custody information;
9. Sample locations, sampling equipment and other equipment used to make field measurements;
10. Calibration data for equipment;
11. Calculations and results;
12. Record of photographs;
13. Site sketches.

4.3.1.2 SAMPLE LABELS

Each sample will be accurately and completely identified. All labels will be moisture-resistant and able to withstand field conditions. Sample containers will be labeled prior to sample collection. The information on each label will include the following, but is not limited to:

- 1) Date/time of collection;
- 2) Sample identity/location;
- 3) Analysis requested;
- 4) Sample type (composite);
- 5) Sample preservation (if required).

4.3.1.3 CHAIN OF CUSTODY RECORD

EPA chain-of-custody records will be completed and maintained throughout the entire site activities as per TAT Standard Operating Procedures (SOP) on sample handling, sample container contract specifications, and EPA Laboratories SOP. The chain-of-custody form to be used lists the following information:

- 1) Sample number;
- 2) Number of sample containers;
- 3) Description of samples including specific location of sample collection;
- 4) Identity of person collecting the sample;
- 5) Date and time of sample collection;
- 6) Date and time of custody transfer to laboratory (if the sample was collected by a person other than laboratory personnel);
- 7) Identity of person accepting custody (if the sample was collected by a person other than the laboratory personnel);
- 8) Identity of laboratory performing the analysis.

4.3.1.4 CHAIN OF CUSTODY SEALS

Chain of Custody Seals demonstrate that a sample container has not been tampered with or opened.

The individual packaging the sample(s) must sign and date the seal, affixing it in such a manner that the container cannot be opened without breaking the seal. The name of this individual, along with a description of the sample packaging, must be noted in the Field Log Book.

4.3.2 SOIL SAMPLING SOP

All samples will be taken such that the soil from the appropriate depth will be removed from the sample location and homogenized in a stainless steel mixing bowl. A representative sample will be collected and transferred into an appropriately labelled sample container. See Appendix A for further reference.

4.3.3 SAMPLE HANDLING AND SHIPMENT SOP

After a sample has been collected, the sample bottle will be capped and affixed with a custody seal. Each sample will be labelled with the appropriate information (including sample number, date and time of collection, analysis requested and preservative used). All of the samples will be packaged and shipped according to the proper DOT shipping regulations. See Appendix B for further reference.

4.4 Schedule of Activities

Soil samples will be collected at the Bayonne Barrel & Drum Site on April 5, 1995 and will be driven to the laboratory for analysis later that day.

5.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The EPA On-Scene Coordinator (OSC), Joe Cosentino, or his designated alternate will provide EPA TAT Region II Contractor, Roy F. Weston, Inc. concerning project sampling needs, objectives, and schedules.

The TAT Project Manager, Heidemarie Adenau, is the primary point of contact with the EPA OSC. The project manager is responsible for the development and completion of the Sampling QA/QC Plan, project team organization, and supervision of all project tasks, including reporting and deliverables.

The TAT Sample Management Officer/Site QC Coordinator, Bartt Booz, is responsible for ensuring field adherence to the Sampling QA/QC Plan and recording any deviations from the plan.

The TAT Analytical Coordinator, Smita Sumbaly, is responsible for soliciting laboratories for analytical services and data validation.

6.0 QUALITY ASSURANCE AND QUALITY CONTROL REQUIREMENTS

The contracted laboratory must conduct its analyses with a quality assurance/quality control (QA/QC) Level 2 (QA-2). In order to ensure accurate data, the following measures are required:

- 1) Sample Documentation;
- 2) Chain of Custody;
- 3) Sample Holding Times;
- 4) Rinse & Field Blanks;
- 5) 5% Matrix Spike/Matrix Spike Duplicate;
- 6) Confirmation Analysis;
- 7) Initial & Continuing Instrument Calibration;
- 8) Performance Evaluation Sample(s);
- 9) Detection Limits;
- 10) Data Summary.

All analytical results are to be submitted by the laboratory to the Roy F. Weston, Inc. Analytical Coordinator. A verbal report will be submitted within twenty-one (21) calendar days of the date the laboratory received the samples for analysis and a written report within twenty-eight (28) days.

7.0 DELIVERABLES

A trip report will be prepared by the Project Manager highlighting the sampling activities and pertinent occurrences and delivered to the OSC within one week of the sampling event. Once the raw data has been received from the laboratory, an analytical package will be provided to the OSC.

8.0 DATA VALIDATION

All steps of data generation and handling will be evaluated by the On-Scene Coordinator (OSC), the Project Manager, and the Quality Assurance Officer for compliance with EPA Region II SOP for validating hazardous waste site data.

9.0 SYSTEM AUDIT

The Quality Assurance/Quality Control (QA/QC) Officer or a designated representative will observe the sampling operations and review subsequent analytical data to assure that the QA/QC project plan has been followed.

10.0 CORRECTIVE ACTIONS

All provisions will be taken in the field and laboratory to ensure that any problems that may develop will be dealt with as quickly as possible to ensure the continuity of the sampling program. Any deviations from this sampling plan will be noted in the final report.

APPENDIX A

1.0 SOIL SAMPLING: SOP #2012

1.1 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to describe the procedures for collecting representative soil samples. Analysis of soil samples may determine whether concentrations of specific soil pollutants exceed established action levels, or if the concentrations of soil pollutants present a risk to public health, welfare, or the environment.

1.2 METHOD SUMMARY

Soil samples may be collected using a variety of methods and equipment. The methods and equipment used are dependent on the depth of the desired sample, the type of sample required (disturbed versus undisturbed), and the type of soil. Near-surface soils may be easily sampled using a spade, trowel, and scoop. Sampling at greater depths may be performed using a hand auger, a trier, a split-spoon, or, if required, a backhoe.

1.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Chemical preservation of solids is not generally recommended. Refrigeration to 4°C, supplemented by a minimal holding time, is usually the best approach.

1.4 INTERFERENCES AND POTENTIAL PROBLEMS

There are two primary interferences or potential problems associated with soil sampling. These include cross-contamination of samples and improper sample collection. Cross-contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample, or inadequate homogenization of the samples where required, resulting in variable, non-representative results.

1.5 EQUIPMENT/APPARATUS

- sampling plan
- maps/plot plan
- safety equipment, as specified in the health and safety plan
- compass
- tape measure
- survey stakes or flags
- camera and film
- stainless steel, plastic, or other appropriate homogenization bucket or bowl
- 1-quart mason jars w/Teflon liners
- Ziploc plastic bags
- logbook

- labels
- chain of custody forms and seals
- field data sheets
- cooler(s)
- ice
- decontamination supplies/equipment
- canvas or plastic sheet
- spade or shovel
- spatula
- scoop
- plastic or stainless steel spoons
- trowel
- continuous flight (screw) auger
- bucket auger
- post hole auger
- extension rods
- T-handle
- sampling trier
- thin-wall tube sampler
- Vehimeyer soil sampler outfit
 - tubes
 - points
 - drive head
 - drop hammer
 - puller jack and grip
- backhoe

1.6 REAGENTS

Reagents are not used for the preservation of soil samples. Decontamination solutions are specified in ERT SOP #2006, Sampling Equipment Decontamination.

1.7 PROCEDURES

1.7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and which equipment and supplies are required.
2. Obtain necessary sampling and monitoring equipment.
3. Decontaminate or preclean equipment, and ensure that it is in working order.
4. Prepare schedules, and coordinate with staff, client, and regulatory agencies, if appropriate.
5. Perform a general site survey prior to site entry in accordance with the site-specific health and safety plan.
6. Use stakes, buoys, or flagging to identify and mark all sampling locations. Consider specific site factors, including extent and nature of contaminant, when selecting sample location. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. All staked locations will be utility-cleared by the property owner prior to soil sampling.

1.7.2 Sample Collection

Sampling at Depth with Augers and Thin-Wall Tube Samplers

This system consists of an auger, a series of extensions, a "T" handle, and a thin-wall tube sampler (Appendix A, Figure 1). The auger is used to bore a hole to a desired sampling depth, and is then withdrawn. The sample may be collected directly from the auger. If a core sample is to be collected, the auger tip is then replaced with a thinwall tube sampler. The system is then lowered down the borehole, and driven into the soil at the completion depth. The system is withdrawn and the core collected from the thin-wall tube sampler.

Several types of augers are available. These include: bucket, continuous flight (screw), and posthole augers. Bucket augers are better for direct sample recovery since they provide a large volume of sample in a short time. When continuous flight augers are used, the sample can be collected directly from the flights, which are usually at 5-foot intervals. The continuous flight augers are satisfactory for use when a composite of the complete soil column is desired. Posthole augers have limited utility for sample collection as they are designed to cut through fibrous, rooted, swampy soil.

Follow these procedures for collecting soil samples with the auger and a thin-wall tube sampler.

1. Attach the auger bit to a drill rod extension, and attach the 'T' handle to the drill rod.
2. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, litter). It may be advisable to remove the first 3 to 6 inches of surface soil for an area approximately 6 inches in radius around the drilling location.
3. Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the hole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding drill rods. It also facilitates refilling the hole, and avoids possible contamination of the surrounding area.
4. After reaching the desired depth, slowly and carefully remove the auger from boring. When sampling directly from the auger, collect sample after the auger is removed from boring and proceed to Step 10.
5. Remove auger tip from drill rods and replace with a pre-cleaned thin-wall tube sampler. Install proper cutting tip.
6. Carefully lower the tube sampler down the borehole. Gradually force the tube sampler into the soil. Care should be taken to avoid scraping the borehole sides. Avoid hammering the drill rods to facilitate coring as the vibrations may cause the boring walls to collapse.
7. Remove the tube sampler, and unscrew the drill rods.
8. Remove the cutting tip and the core from the device.
9. Discard the top of the core (approximately 1 inch), as this represents material collected before penetration of the layer of concern. Place the remaining core into the appropriate labeled sample container(s). Sample homogenization is not required.

10. If volatile organic analysis is to be performed, transfer a portion of the sample directly into an appropriate, labeled sample container(s) with a stainless steel lab spoon, plastic lab spoon, or equivalent and secure the cap(s) tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into an appropriate, labeled container(s) and secure the cap(s) tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into the appropriate, labeled container(s) and secure the cap(s) tightly.
11. If another sample is to be collected in the same hole, but at a greater depth, reattach the auger bit to the drill and assembly, and follow steps 3 through 11, making sure to decontaminate the auger and tube sampler between samples.
12. Abandon the hole according to applicable state regulations. Generally, shallow holes can simply be backfilled with the removed soil material.

Sampling at Depth with a Trier

The system consists of a trier, and a "T" handle. The auger is driven into the soil to be sampled and used to extract a core sample from the appropriate depth.

Follow these procedures to collect soil samples with a sampling trier.

1. Insert the trier (Appendix A, Figure 2) into the material to be sampled at a (0° to 45° angle from horizontal. This orientation minimizes the spillage of sample.
2. Rotate the trier once or twice to cut a core of material.
3. Slowly withdraw the trier, making sure that the slot is facing upward.
4. If volatile organic analysis is to be performed, transfer a portion of the sample directly into an appropriate, labeled sample container(s) with a stainless steel lab spoon, plastic lab spoon, or equivalent and secure the cap(s) tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into an appropriate, labeled container(s) and secure the cap(s) tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into an appropriate, labeled container(s) and secure the cap(s) tightly.

Sampling at Depth with a Split Spoon (Barrel) Sampler

The procedure for split spoon sampling describes the collection and extraction of undisturbed soil cores of 18 or 24 inches in length. A series of consecutive cores may be extracted with a split spoon sampler to give a complete soil column profile, or an auger may be used to drill down to the desired depth for sampling. The split spoon is then driven to its sampling depth through the bottom of the augured hole and the core extracted.

When split tube sampling is performed to gain geologic information, all work should be performed in accordance with ASTM D 1586-67 (reapproved 1974).

Follow these procedures for collecting soil samples with a split spoon.

1. Assemble the sampler by aligning both sides of the barrel and then screwing the bit onto the bottom and the heavier head piece onto the top.
2. Place the sampler in a perpendicular position on the sample material.
3. Using a sledge hammer or well ring, if available, drive the tube. Do not drive past the bottom of the head piece or compression of the sample will result.
4. Record in the site logbook or on field data sheets the length of the tube used to penetrate the material being sampled, and the number of blows required to obtain this depth.
5. Withdraw the sampler, and open by unscrewing the bit and head and splitting the barrel. If a split sample is desired, a cleaned, stainless steel knife should be used to divide the tube contents in half, longitudinally. This sampler is typically available in diameters of 2 and 3 1/2 inches. However, in order to obtain the required sample volume, use of a larger barrel may be required.
6. Without disturbing the core, transfer it to an appropriate labeled sample container(s) and seal tightly.

1.8 CALCULATIONS

This section is not applicable to this SOP.

1.9 QUALITY ASSURANCE/ QUALITY CONTROL

There are no specific quality assurance activities which apply to the implementation of these procedures. However, the following QA procedures apply:

- All data must be documented on field data sheets or within site logbooks.
- All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

1.10 DATA VALIDATION

This section is not applicable to this SOP.

1.11 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, and specific health and safety procedures.

APPENDIX B

1.0 SAMPLING EQUIPMENT DECONTAMINATION: SOP #2006

1.1 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes methods used for preventing or reducing cross-contamination, and provides general guidelines for sampling equipment decontamination procedures at a hazardous waste site. Preventing or minimizing cross-contamination in sampled media and in samples is important for preventing the introduction of error into sampling results and for protecting the health and safety of site personnel.

Removing or neutralizing contaminants that have accumulated on sampling equipment ensures protection of personnel from permeating substances, reduces or eliminated transfer of contaminants to clean areas, prevents the mixing of incompatible substances, and minimizes the likelihood of sample cross-contamination.

1.2 METHOD SUMMARY

Contaminants can be physically removed from equipment, or deactivated by sterilization or disinfection. Gross contamination of equipment requires physical decontamination, including abrasive and non-abrasive methods. These include the use of brushes, air and wet blasting, and high-pressure water cleaning, followed by a wash/rinse process using appropriate cleaning solutions. Use of a solvent rinse is required when organic contamination is present.

1.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

This section is not applicable to this SOP.

1.4 INTERFERENCES AND POTENTIAL PROBLEMS

- The use of distilled/deionized water commonly available from commercial vendors may be acceptable for decontamination of sampling equipment provided that it has been verified by laboratory analysis to be analyte free.
- An untreated potable water supply is not an acceptable substitute for tap water. Tap water may be used from any municipal water treatment system for mixing of decontamination solutions.
- Acids and solvents utilized in the decontamination sequence pose the health and safety risks of inhalation or skin contact, and raise shipping concerns of permeation or degradation.
- The site work plan must address disposal of the spent decontamination solutions.

- Several procedures can be established to minimize contact with waste and the potential for contamination. For example:
 - Stress work practices that minimize contact with hazardous substances.
 - Use remote sampling, handling, and container-opening techniques when appropriate.
 - Cover monitoring and sampling equipment with protective material to minimize contamination.
 - Use disposable outer garments and disposable sampling equipment when appropriate.

1.5 EQUIPMENT/APPARATUS

- appropriate personal protective clothing
- non-phosphate detergent
- selected solvents
- long-handled brushes
- drop cloths/plastic sheeting
- trash container
- paper towels
- galvanized tubs or buckets
- tap water
- distilled/deionized water
- metal/plastic containers for storage and disposal of contaminated wash solutions
- pressurized sprayers for tap and deionized/distilled water
- sprayers for solvents
- trash bags
- aluminum foil
- safety glasses or splash shield
- emergency eyewash bottle

1.6 REAGENTS

There are no reagents used in this procedure aside from the actual decontamination solutions and solvents. In general, the following solvents are utilized for decontamination purposes:

- 10% nitric acid ⁽¹⁾
- acetone (pesticide grade) ⁽²⁾
- hexane (pesticide grade) ⁽²⁾
- methanol

⁽¹⁾ Only if sample is to analyzed for trace metals.

⁽²⁾ Only if sample is to analyzed for organics.

1.7 PROCEDURES

As part of the health and safety plan, develop and set up a decontamination plan before any personnel or equipment enter the areas of potential exposure. The equipment decontamination plan should include:

- the number, location, and layout of decontamination stations
- which decontamination apparatus is needed
- the appropriate decontamination methods
- methods for disposal of contaminated clothing, apparatus, and solutions

1.7.1 Decontamination Methods

All personnel, samples, and equipment leaving the contaminated area of a site must be decontaminated. Various decontamination methods will either physically remove contaminants, inactive contaminants by disinfection or sterilization, or do both.

In many cases, gross contamination can be removed by physical means. The physical decontamination techniques appropriate for equipment decontamination can be grouped into tow categories: abrasive methods and non-abrasive methods.

Abrasive Cleaning Methods

Abrasive cleaning methods work by rubbing and wearing away the top layer of the surface containing the contaminant. The following methods are available:

- **Mechanical:** Mechanical cleaning method use brushes of metal or nylon. The amount and type of contaminants removed will vary with the hardness of bristles, length of brushing time, and degree of brush

contact.

- **Air Blasting:** Air blasting is used for cleaning large equipment, such as bulldozers, drilling rigs or auger bits. The equipment used in air blast cleaning employs compressed air to force abrasive material through a nozzle at high velocities. the distance between the nozzle and the surface cleaned, as well as the pressure of air, the time of application, and the angle at which the abrasive strikes the surface, determines cleaning efficiency. Air blasting has several dis-advantages: it is unable to control the amount of material removed, it can aerate contaminants, and it generates large amounts of waste.
- **Wet Blasting:** Wet blast cleaning, also used to clean large equipment, involves use of a suspended fine abrasive delivered by compressed air to the contaminated area. The amount of materials removed can be carefully controlled by using very fine abrasives. This method generates a large amount of waste.

Non-Abrasive Cleaning Methods

Non-abrasive cleaning methods work by forcing the contaminant off of a surface with pressure. In general, less of the equipment surface is removed using non-abrasive methods. The following non-abrasive methods are available:

- **High-Pressure Water:** This method consists of a high-pressure pump, an operator-controlled directional nozzle, and a high-pressure hose. Operating pressure usually ranges from 340 to 680 atmospheres (atm) which related to flow rate of 20 to 140 liters per minute.
- **Ultra-High-Pressure Water:** This system produces a pressurized water jet (from 1,000 to 4,000 atm). the ultra-high-pressure spray removes tightly-adhered surface film. The water velocity ranges from 500 m/sec (1,000 atm) to 900 m/sec (4,000 atm). Additives can enhance the method. this method is not applicable for hand-held sampling equipment.

Disinfection/Rinse Methods

- **Disinfection:** Disinfectants are a practical means of inactivating infectious agents.
- **Sterilization:** Standard sterilization methods involve heating the equipment. Sterilization is impractical for large equipment.
- **Rinsing:** Rinsing removes contaminants through dilution, physical attraction, and solubilization.

1.7.2 Field Sampling Equipment Cleaning Procedures

Solvent rinses are not necessarily required when organics are not a contaminant of concern and may be eliminated from the sequence specified below. Similarly, an acid rinse is not required if analysis does not include inorganics.

1. Where applicable, follow physical removal procedures specified in section 1.7.1.
2. Wash equipment with a non-phosphate detergent solution.
3. Rinse with tap water.
4. Rinse with distilled/deionized water.
5. Rinse with 10% nitric acid if the sample will be analyzed for trace metals.
6. Rinse with distilled/deionized water.
7. Use a solvent rinse (pesticide grade) if the sample will be analyzed for organics.
8. Air dry the equipment completely.
9. Rinse again with distilled/deionized water.

Selection of the solvent for use in the decontamination process is based on the contaminant present at the site. Use of a solvent is required when organic contamination is present on-site. Typical solvents used for removal of organic contaminants include acetone, hexane, or water. An acid rinse step is required if metals are present on site. If a particular contaminant fraction is not present at the site, the nine-step decontamination procedure listed above may be modified for site specificity. The decontamination solvent used should not be among the contaminants

of concern at the site.

Table 1 lists solvent rinses which may be required for elimination of particular chemicals. After each solvent rinse, the equipment should be air dried and rinsed with distilled/deionized water.

Sampling equipment that required the use of plastic tubing should be disassembled and the tubing replaced with clean tubing, before commencement of sampling and between sampling locations.

1.8 CALCULATIONS

This section is not applicable to this SOP.

1.9 QUALITY ASSURANCE/QUALITY CONTROL

One type of quality control sample specific to the field decontamination process is the rinsate blank. The rinsate blank provides information on the effectiveness of the decontamination process employed in the field. When used in conjunction with field blanks and trip blanks, a rinsate blank can detect contamination during sample handling, storage and sample transportation to the laboratory.

Table 1: Recommended Solvent Rinse for Soluble Contaminants

SOLVENT	SOLUBLE CONTAMINANTS
Water	<ul style="list-style-type: none">● Low-chain hydrocarbons● Inorganic compounds● Salts● Some organic acids and other polar compounds
Dilute Acids	<ul style="list-style-type: none">● Basic (caustic) compounds● Amines● Hydrazines
Dilute Bases—for example, detergent and soap	<ul style="list-style-type: none">● Metals● Acidic compounds● Phenol● Thiols● Some nitro and sulfonic compounds
Organic Solvents ⁽¹⁾ - for example, alcohols, ethers, ketones, aromatics, straight-chain alkanes (e.g., hexane), and common petroleum products (e.g., fuel, oil, kerosene)	<ul style="list-style-type: none">● Nonpolar compounds (e.g., some organic compounds)

⁽¹⁾ **WARNING:** Some organic solvents can permeate and/or degrade protective clothing.

A rinsate blank consists of a sample of analyte-free (i.e., deionized) water which is passed over and through a field decontaminated sampling device and placed in a clean sample container.

Rinsate blanks should be run for all parameters of interest at a rate of 1 per 20 for each parameter, even if samples are not shipped that day. Rinsate blanks are not required if dedicated sampling equipment is used.

1.10 DATA VALIDATION

This section is not applicable to this SOP.

1.11 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA and specific health and safety procedures.

Decontamination can pose hazards under certain circumstances even though performed to protect health and safety. Hazardous substances may be incompatible with decontamination methods. For example, the decontamination solution or solvent may react with contaminants to produce heat, explosion, or toxic products. Decontamination methods may be incompatible with clothing or equipment; some solvents can permeate or degrade protective clothing. Also, decontamination solution and solvents may pose a direct health hazard to workers through inhalation or skin contact, or if they combust.

The decontamination solutions and solvents must be determined to be compatible before use. Any method that permeates, degrades, or damages personal protective equipment should not be used. If decontamination methods pose a direct health hazard, measures should be taken to protect personnel or the methods should be modified to eliminate the hazard.